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COMMENT

MANUFACTURER'S LIABILITY FOR DEFECTIVE AUTOMOBILE DESIGN

"The chariots shall rage in the streets" was a prediction announced twenty-five centuries ago.¹ The degree of fulfillment of this vision must certainly have been beyond the wildest expectations of its maker, for every year, the raging chariots consume tens of thousands of lives and billions of dollars of property in the United States alone. With automobiles as well as chariots, the law has long imposed civil liability as a consequence for negligent operation of a vehicle which results in death or injury. However, liability of a manufacturer for errors in performance of his duties is a recent phenomenon,² and as the automobile age nears the conclusion of its seventh decade, is by no means settled in its extent. While it has been conclusively settled that a manufacturer may incur liability for faulty *construction* of a motor vehicle,³ courts have been peculiarly reluctant to impose similar liability for damage sustained as a consequence of errors in *design*, which, obviously, may as surely result in injury as may negligent construction.

It is understandable why courts hesitated to impose liability for errors in design upon auto manufacturers during the infancy of the automobile.⁴ During the early period, formulation of legal standards

¹ Attributed to Nahum, a Hebrew prophet, around 500 B.C. See CLEVELAND & WILLIAMSON, *THE ROAD IS YOURS* 34 (1950).

² Several early cases related to design errors actually turned on express warranty grounds. In *Bahlman v. Hudson Motor Car Co.*, 290 Mich. 683, 288 N.W. 309 (1939), plaintiff recovered for injuries received from striking a jagged steel seam in the roof of a car advertised as having a "seamless steel roof." Likewise, in *Baxter v. Ford Motor Co.*, 168 Wash. 456, 12 P.2d 409 (1935), plaintiff recovered for injuries incurred when a window shattered, the window having been advertised as "so made that it will not fly or shatter under the hardest impact." Only recently, however, has implied warranty furnished a wide basis for liability for injuries owing to defects. The landmark case, *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 161 A.2d 69 (1960), resulted in recovery for injuries caused by the crash of a new Plymouth, which went out of control for an undetermined reason, presumably due to some defect in the steering assembly.

³ Manufacturer's liability for faulty construction was settled by *MacPherson v. Buick Motor Co.*, 217 N.Y. 382, 111 N.E. 1050 (1916). Not until 1954, however, was the liability of automobile manufacturers established for negligence in design alone, without accompanying defects in construction. *Carpini v. Pittsburg & Weirton Bus Co.*, 216 F.2d 404 (3d Cir. 1954).

⁴ Even the best and most thoughtfully designed and constructed automobiles manufactured previous to 1910 were frequently subject to a wide variety of failures attributable largely to their experimental stage of development. See *BIRD & HALLOWS, THE ROLLS ROYCE MOTOR CAR* 30-35 (1965).

in respect to acceptable design techniques would have been virtually impossible. Particular makes and models of automobiles which were unusually susceptible to certain mechanical failures due to design faults (such as brake, steering, and suspension failures) were more often the butt of popular jokes than sources of tort liability to their manufacturers.⁵

Recent technological developments demonstrate, however, that the art of designing and manufacturing safe and durable automobiles has been mastered. Industry critics now contend that most American automakers have failed to take advantage of knowledge acquired on the subject of safety for the motorists who use, and those who are struck by, their automobiles.⁶ It has been contended that in many instances, manufacturers incorporate some features into their automobiles which actually magnify the hazards of operation without fulfilling any significant function.⁷ One result of these criticisms is that considerable attention has been brought to bear on the injury-producing potential of automobiles, apart from the long-recognized foibles of drivers. Public concern over the issue of design safety of automobiles has arisen and is said to have accounted for a fifty per cent drop in the sales of one model of automobile, and a lesser slackening in the sales of most other brands.⁸ Congressional response to the matter of auto-

⁵The jeer heard most frequently by the early-day motoring fraternity must undoubtedly have been that issued by onlookers when a horseless carriage refused to run; that is, "Get a horse!" The pre-1930 Bentley, a very creditable machine, known for its speed and very rough ride, was called "the world's fastest lorry" by its critics. When challenged about the wisdom of equipping his fast, expensive cars with dangerously inadequate mechanical brakes long after superior hydraulic brakes were common, the famous Italian car builder, Ettore Bugatti, is reported to have stated, "Any fool can make a car go slowly. It takes a genius to make one go fast."

⁶See O'Connell, *Taming the Automobile*, 58 Nw. U.L. Rev. 299, 356-70 (1963), for a critical accounting of industry attitude and activity in the area of safety for automobile users. Lest it appear that auto manufacturers have resisted strong public sentiment in favor of designing and building safer cars, see O'Connell, *supra* at 397-98, for theories on the state of, and possible cause of public apathy towards efforts to supply safer automobiles. For more resounding indictments of the automotive industry, foreign and domestic, see generally NADER, *UNSAFE AT ANY SPEED* (1965); O'CONNELL & MYERS, *SAFETY LAST* (1966).

Criticism has also been leveled at automobile accident reporting procedures, which, it is contended, ascribe to driver error many accidents which are in fact due to mechanical factors in the automobile. See O'Connell, *supra* at 317-20.

⁷*E.g.*, ornamental gimmicks which tend to produce injury but in no way aid in the intended function of the automobile. Such items as hood ornaments, headlight visors, and other sharp exterior trim features tend to aggravate pedestrian injuries, but accomplish no purpose. Elimination of the center doorpost creates a stylish "hardtop" look, a needless frivolity, but unreasonably weakens the roof structure of the car, which increases risk of injury in rollover type accidents.

⁸For comparative sales volumes before and after the commencement of safety campaign publicity, see Wall Street Journal, Sept. 6, 1966, p. 2, col. 2, wherein some general sales decline is noted, but a decline of over fifty per cent is shown for Corvair. This drop in volume is attributed to the safety campaign in Barron's, Sept. 5, 1966, p. 1.

motive design safety has taken the form of legislation which provides for regulation of automotive design largely by means of requirements that certain safety features be incorporated in automobiles by specified dates.⁹ Most of these features will be those which already are scheduled to be required in cars purchased for government use by the General Services Administration. Included in this list, for example, for the 1967 models are such features as dual braking systems, recessed instrument panel features, and four-way flashers.¹⁰

While the new laws may eventually have considerable impact upon automotive design, it is reasonable to conjecture that for some time at least, regulations will be oriented towards incorporation of a relatively small number of separate safety-improvement components, (such as seat belts, outside mirrors, safety door latches, etc.) leaving the great preponderance of automotive design decisions in the hands of the manufacturer.¹¹ Passage of comprehensive legislation covering automotive design is improbable. It is within the areas not covered by legislation that the courts must act to protect automobile users, especially in view of the manufacturers' reactions to criticism.

The industry has realized the consequences of liability based on design errors and has countered the recent unfavorable publicity on automobile safety with a smokescreen of propaganda designed both to convince the public that modern automobiles are safe, and to demonstrate that incorporation of most of the safety features suggested by independent researchers would increase the cost of manufacture beyond reason.¹² Concern thus expressed by industry leaders is under-

⁹ National Traffic and Motor Vehicle Safety Act, 80 Stat. 718 (1966), found in 1966 U.S. CODE CONG. & AD. NEWS 2721. Key provisions include the empowering of the Secretary of Commerce to prescribe motor vehicle safety standards, §103, 80 Stat. 718, establishment of a National Motor Vehicle Safety Advisory Council, §104, 80 Stat. 718, authorization to conduct research and experiments relative to promulgation of safety standards, §106, 80 Stat. 718, and a provision requiring manufacturers to notify purchasers of their vehicles whenever a defect related to safety becomes apparent, §113, 80 Stat. 718.

¹⁰ Most notable of the safety features to be required on 1968 model cars by the National Traffic Safety Agency are dashboard controls in accessible places but out of impact range, spacing of quadrant positions on automatic transmission selectors to prevent gear selection errors, dual braking systems which prevent brake failure on all four wheels simultaneously, reduction of glare-producing trim on dashboards and exteriors, larger capacity tires, collapsible, energy absorbing steering columns, tougher door latches, seat belts in all forward-facing seats, and locks on hinged front seat backs. See *Time*, Dec. 9, 1966, pp. 97, 98.

¹¹ No reference is made in the Congressional legislation or the regulations made in its pursuance to critical safety matters such as brake performance, strength of materials in steering components, or suspension design.

¹² See, e.g., *Wall Street Journal*, Jan. 13, 1966, p. 2, col. 3 (statement of General Motors President Roche that auto industry must do a better job of public relations to disprove criticism that cars are unsafe), and *DESIGN FOR SAFETY*, published by General Motors Public Relations Staff (1965).

standable, since each one of the forty million automobiles currently in use, as well as any produced in the future represent a potential source of tort liability.¹³ It is to be noted that liability for negligent design of a product generally does not expire solely on the basis of advancing age of the item itself. In this respect, potential liability for design errors might long outlast that for construction errors, since normal wear and deterioration is more likely to obscure evidence bearing on errors in construction than in design.¹⁴

In determining a manufacturer's liability for personal injuries which result from its products, the customary approach adopted by courts is to apply negligence theory. Thus, in most cases, liability is attached if the product which caused the injury is shown to have created an unreasonable risk of such injury because of its design or composition.¹⁵ Formulas for determining "reasonableness" of risk may vary. One approach is to balance the likelihood of harm, and the gravity of the harm if it occurs against the burden on the manufacturer occasioned by use of alternatives which would avert or alleviate such harm.¹⁶ Writers tend to discuss product liability in light of such factors as foreseeability of injury and the "state of the art," which are expressions related to the duty of care to be exercised by the manufacturer.¹⁷ References to duty of care imply adoption of negligence principles rather than imposition of absolute product-safety standards.

There is, however, a growing trend toward application of the "strict liability" doctrine to dispose of products liability cases.¹⁸ The essen-

¹³ Liability for negligent design is not to be considered as limited to new or late model cars. In *Mickle v. Blackmon, Cherokee Const. Co. & Ford Motor Co.*, Cir. Ct., 6th Judicial Cir., York County, S.C., (March 1963), plaintiff recovered for injuries received as a result of alleged design negligence in a 1949 Ford. See Nader, *Automobile Design: Evidence Catching up With the Law*, 42 DENVER L. CEN. J. 32, 37 (1965). Assuming that the normal "lead time" of three years between finalization of the design and actual production existed in the case of the 1949 Ford, it is to be noted that the design was complete in 1946, or seventeen years before the accident complained of.

¹⁴ Whereas wear and age are always relevant considerations in determining whether or not a part failed because of defective design, they are not relevant factors in many design questions, since the particular component allegedly of defective design may be unaffected by age or length of service. Most typical of this type would be components whose design unreasonably increases the risk of second collision injuries, such as sharp projections from the dashboard, etc. See 16 AM. JUR. PROOF OF FACTS 68, 70 (1965), for a representative illustration.

¹⁵ PROSSER, TORTS § 96 (3d ed. 1964).

¹⁶ See *Carpini v. Pittsburg & Weirton Bus Co.*, 216 F.2d 404 (3d Cir. 1954).

¹⁷ See generally Noel, *Manufacturer's Negligence of Design or Directions for Use of a Product*, 71 YALE L.J. 816 (1962); Katz, *Liability of Automobile Manufacturers for Unsafe Design of Passenger Cars*, 69 HARV. L. REV. 863 (1956).

¹⁸ PROSSER, *The Assault Upon the Citadel (Strict Liability to the Consumer)*, 69 YALE L.J. 1099, 1113-14 (1960); RESTATEMENT (SECOND), TORTS § 402A (1965).

tial element of the strict liability doctrine is that there is no burden upon the plaintiff to show specific negligence on the manufacturer's part in building the injury-causing product.¹⁹ All that is required is a showing that the product was defective, and that it was defective at the time it left the hands of the manufacturer, and, of course, that the defect alleged was the cause in fact of the injury.²⁰

It is apparent, however, that in considering questions of automotive design, the effect of applying strict liability instead of conventional negligence principles is quite nominal. This is because elements of proof required to establish liability under either approach are substantially the same.²¹ In both cases, the most difficult matter for the plaintiff is proving that a defect existed.²² Unlike defective construction questions, where the performance of the offending product may be compared to other products of the same design, questions of design present real difficulty in determining whether or not a defect exists. Automobile design cases are further complicated by the known injury-producing propensities of automobiles, even in the absence of defects.²³ Once the existence of a design defect is shown, it is not difficult to prove that it was due to the negligence of the manufacturer, since the very showing of a defect requires proof that the manufacturer failed to discharge its duty to execute a design which, within limitations imposed by the state of the art and the intended function of the machine, presents no unreasonable risk of injury. The practical consequences of proving existence of a defect traceable to the manufacturer under negligence principles has been described as follows: "[I]n cases against manufacturers, once the cause of harm is laid at their doorstep, a jury verdict for the defendant on the negligence issue is virtually unknown."²⁴ The differences between strict liability and negligence theory as to elements of proof required to establish liability are further obviated in automotive design cases by the ease with which the manufacturer may be identified with its product.

While under the strict liability concept, in its pure form, there may be little difference in the result from that obtaining under negligence theory, it is to be noted that the concept of strict liability has under-

¹⁹ Prosser, *supra* note 18, at 1114.

²⁰ *Ibid.*

²¹ *Ibid.*

²² *Ibid.*

²³ See O'Connell, *Taming the Automobile*, 58 Nw. U.L. Rev. 299, 322-23 (1963).

²⁴ Prosser, *supra* note 18, at 1115.

gone expansion in some quarters.²⁵ The classic formula for strict liability, as set forth in the *Restatement (Second), Torts*, continues to include proving of a defect traceable to the manufacturer as a prerequisite to liability.²⁶ There are, however, indications that in some cases liability may be attached in the event a defect occurs only after a long period of time, even when it can be shown by the defendant that, at the time of manufacture, not even the best expert would have foreseen the development of the defect.²⁷ Such a standard for liability is to be viewed as a departure from *both* negligence and strict liability doctrines of tort liability, in favor of a policy of risk-spreading. Application of this principle to automotive design litigation is of questionable soundness because of the inevitability of some injury occurring regardless of the design of automobiles, because of their function.²⁸ Furthermore, such a broad basis for liability could tend to stifle salutary design developments, since manufacturers would hesitate to run the risk of liability attendant on any departure from time-proven ideas.

Proving a defect in design is, therefore, the essential part of any case for manufacturer's liability. For this reason, primary attention will now be focused upon the manner in which an injury-causing automotive component should be examined in order to determine whether it is defective.

Two separate aspects of design safety face the automobile manufacturer. The first of these is protection of motorists from unreasonable risk of initial collision or upset attributable to design characteristics of the vehicle, such as inadequate braking, steering, or suspension

²⁵ See Shanker, *Strict Tort Theory of Products Liability and the Uniform Commercial Code*, 17 W. RES. L. REV. 5, 23 (1965); Keeton, *Products Liability—Current Developments*, 40 TEXAS L. REV. 193, 199 (1961). For a discussion of the rapidity of legal developments in products liability based upon warranty grounds, see generally Prosser, *The Fall of the Citadel (Strict Liability to the Consumer)*, 50 MINN. L. REV. 791, 793-94 (1966).

²⁶ RESTATEMENT (SECOND), TORTS § 402A. Special Liability of Seller of Product for Physical Harm to User or Consumer.

(1) One who sells any product in a defective condition unreasonably dangerous to the user or consumer or to his property is subject to liability for physical harm thereby caused to the ultimate user or consumer, or to his property, if (a) the seller is engaged in the business of selling such a product, and (b) it is expected to and does reach the user or consumer without substantial change in the condition in which it is sold.

(2) The rule stated in Subsection (1) applies although (a) the seller has exercised all possible care in the preparation and sale of his product, and (b) the user or consumer has not bought the product from or entered into any contractual relation with the seller.

This indicates that at least part of the intended function of strict liability is to relieve a plaintiff of establishing privity of contract as a requisite to recovery.

²⁷ Noel, *supra* note 17, at 877.

²⁸ O'Connell, *supra* note 23, at 322-23.

components. The second is protection of occupants from unreasonable risk of injury once an accident has occurred. The injuries which result from automobile accidents are frequently the type characterized as "second collision" injuries, since they occur when the victim is thrown against, or through, some component of the interior of the vehicle.²⁹ The manufacturer's duty to protect occupants from unreasonable risk of injury upon the "second collision" prevails regardless of the cause of the initial accident, since accidents are reasonably viewed as a foreseeable risk of motoring.

The question of the extent of the manufacturer's liability for damages arising from a collision or upset which is chargeable to the manufacturer's error is relatively simple, since the manufacturer, if liable, is liable for all damages proximately caused by the accident. If, however, the claim is made that although the initial accident was not due to design error, but that the injuries resulting were either caused or aggravated by some error in the design of the car which created an unreasonable risk of injury upon the "second collision," the question is much more complicated. Since injuries are a normal consequence of collision or upset, the plaintiff must prove that the injuries complained of were caused by specific defects in the design of the vehicle, and were not to be expected in the absence of defective design.³⁰ Evidence relating to this issue must be adduced both from the characteristics of the plaintiff's injuries, and the automobile involved. Aside from the extreme complexity of evidence of such a technical nature, it is likely that interested parties' attention is directed to questions of vehicle operator's liability rather than possible liability of the manufacturer. Thus, observations of victim's injuries with an eye to their specific causes are not made or are forgotten, and the other vital source of evidence, the automobile involved, soon disappears in the rusty anonymity of the scrapyard.³¹

²⁹ The "second collision" is the impact which occurs between the passenger and the vehicle which has stopped suddenly due to the initial collision. Sudden deceleration of an automobile causes objects contained within it to continue their forward motion until stopped by some obstacle. In the case of an auto accident victim it is frequently the windshield, dashboard, or roof pillar which is the obstacle stopping his forward motion within the car. Passenger injuries are therefore related to the characteristics of the object with which a passenger collides upon sudden or instantaneous deceleration of the automobile. See O'Connell, *supra* note 23, at 343-56.

³⁰ Even if a strict liability doctrine is applied, there is a burden on an injured plaintiff to show that his injuries are attributable to a specific design feature of the automobile involved, and that furthermore, there are alternative methods of design which should have been used. These elements are required to show the existence of a defect. See text accompanying note 33 *infra*.

³¹ Unusual good fortune prevailed in one case where counsel for the defendant

To prove defective design, it is insufficient merely to assert that a different design would have alleviated or averted the plaintiff's injuries, since it may be assumed that any particular accident involving man and machine might have been avoided through a variation in the design of the machine.³² However, such a variation might greatly magnify the chances of other sorts of mishaps taking place, or else render the machine incapable of reasonably efficient performance of its function.³³ While a showing that an alternative design would have averted the injury complained of is essential to proof of existence of a defect, it is by no means the full extent of proof which should be required to establish liability. Some examination of the process of automotive design must be made prior to any attempt to decide the issue of whether or not a component is defective.

The process of designing any complex product requires selection from a vast number of alternative solutions. Automotive design is further complicated by the inherently ambivalent function which it must serve. Safety of operation, while an important objective of the designer, must compete with the often inconsistent goals of economy in construction and operation, speed and "exciting" performance, and stylish appearance. The automobile signifies far more in society than a means of safe and efficient movement of persons and property from one point to another. It has reached the status of a symbol of independence, identity, and success for its users. Goods and services devoted to manufacture and use of automobiles comprise a major element of the national economy, with the result that an automotive designer is compelled to execute designs which are commercially successful. The manufacturer is therefore required to balance these considerations in the process of deciding what features are to be included in the final product, and frequently, some danger to the user is an unavoidable consequence of the fulfillment of the function of the machine. The safest airplane which could possibly be designed would never leave the ground, because it would be so laden with safety devices that it would be unable to fly. Any theory imposing liability for design must take this consideration into account. While conceding that in many

manufacturer needed the automobile involved for evidence. The automobile, which had been repaired subsequent to the accident, was discovered on a used car lot over 200 miles from the site of the accident. See *Time*, Sept. 10, 1965, p. 37.

³² See text accompanying note 35 *infra*.

³³ *Cooley v. Public Service Co.*, 90 N.H. 460, 10 A.2d 673 (1940): The defendant public utility was held not to owe a duty to place a device under its electrical transmission wires to prevent their falling on telephone lines, since to do so would be unreasonably burdensome, and increase risks of other types of mishaps.

respects, certain manufacturers—indeed, entire industries, may engage in design and production of defective products,³⁴ the province of the law should be that of an arbiter of these competing social interests; its function being only to require that degree of care which best reflects these interests.

It is therefore submitted that an injured plaintiff who contends that an automobile was negligently or defectively designed ought to be required to prove that the manufacturer failed to meet, in some material respect, the standard of care in execution of the design which should be reasonably expected of it. The standard of care appropriately applied to the designer is composed of two distinct duties, with failure to discharge either one generally considered to be sufficient to attach liability. These duties are to become apprised of technological developments in the industry as they occur, and to make selections among the alternatives thereby recognized in order to arrive at a final product design which represents a good, practicable, choice. The second duty includes the affirmative duty to test one's product to discover its dangerous propensities, if any.³⁵ The general terms of this standard do little to establish the extent of the manufacturer's legal obligations under these duties. Examination of actual problems in determination of the extent of the manufacturer's duties may be useful.

In no case would the manufacturer's duty to know of engineering developments seem more clear-cut than when one of its own designers has filed a patent application for a design improvement, wherein are set out specific complaints and shortcomings of the currently-used design. Such was the case, however, with the 1960-1964 Chevrolet Corvairs. The phenomenon which has created driving excitement among Corvair owners is "oversteer," which is pronounced in the

³⁴ "[A] whole calling may have unduly lagged in the adoption of new and available devices. It may never set its own tests, however persuasive be its usages. Courts must in the end say what is required; there are precautions so imperative that even their universal disregard will not excuse their omission . . ." Opinion of L. Hand, J., *The T. J. Hooper*, 60 F.2d 737, 740 (2d Cir. 1932).

³⁵ "The maker of an article for sale or use by others must use reasonable care and skill in designing it . . . And a person who undertakes such manufacturing will be held to the skill of an expert in that business and to an expert's knowledge of the arts, materials, and processes. Thus, he must keep reasonably abreast of scientific knowledge and discoveries touching his product . . . He may also be required to make tests to determine the dangerous propensities of his product." 2 HARPER & JAMES, *TORTS* § 28.4 (1956).

This statement suggests strongly the sound rule that there are legally-imposed standards for the carrying out of product testing, possibly even to the extent of testing competitors' products for meritorious safety characteristics.

Corvairs built from 1960-1964. The fact that the Corvair is equipped with simple swing-axle rear suspension, and a rear mounted engine is responsible for the oversteer. The result is that during the negotiation of a corner, the rear wheels tend to track, or drift, towards the outside of the corner through which the car is moving, thereby accentuating the anticipated effect of turning the steering wheel. This oversteer increases sharply in degree as a function of the speed of the car combined with the inverse of the radius of the turn being negotiated, to the point that under unusually sharp cornering at high speeds, the rear wheel camber angle causes the tires to lose most of their traction. The result may be such a loss of control that the car spins out.³⁶

This characteristic is quite well known, as it is displayed to varying extent by all rear engine, swing-axle cars, and may be readily compensated for by expert operators.³⁷ The danger presented to the motoring public, unaccustomed as it is to such "sports," should have been apparent to General Motors, since one of their consultants, in a notation accompanying a patent application, stated this:³⁸

In particular the ordinary swing axle, under severe lateral forces produced by cornering, tends to lift the rear end of the vehicle, so that both wheels assume severe positive camber positions to such an extent that the vehicle not only "oversteers" but actually tends to roll over.

If this did not constitute reasonable warning that more design research was called for prior to the release of the Corvair, perhaps General Motors' attention should be directed to an issue of its own publication. The *General Motors Engineering Journal*, in 1959 warned that auto manufacturers had only begun to accumulate adequate information as to the behavior of automobiles in emergency situations, such as hard cornering.³⁹ In spite of abundant and pertinent warning, however, General Motors chose to defer correction of the Corvair problem until the 1965 model year, in which a full-independent rear suspension was substituted for the swing-axle version. The new Corvairs with the

³⁶ For a schematic sequence diagram of the behavior of swing-axle suspension, see Nader, *op. cit. supra* note 6, at 31. For an account of some of the bizarre experiences which have been caused by automobiles with this type of design, see *Test Report of the Renault R-8 Gordini*, in *Popular Mechanics*, July 1965, p. 36.

³⁷ For a further description of characteristics of swing-axle rear suspensions see 16 AM. JUR. PROOF OF FACTS 31 (1965). For a driver's impression of 1964 and earlier Corvairs, see *Road Research Report: Corvair Corsa*, Car and Driver, Oct. 1964, pp. 31, 33-34.

³⁸ U.S. Patent No. 2,911,052, Maurice Olley, Nov. 1959, quoted in Philo, *Automobile Products Liability Litigation*, 4 DUQUESNE L. REV. 181, 194 (1965).

³⁹ See report by Kohr in 6 *General Motors Engineering J.*, April-May-June 1959, pp. 14, 19. For additional remarks, see Philo, *supra* note 38, at 194.

independent rear suspension have been described as among the best car available in terms of handling characteristics.⁴⁰

While it is submitted that the early Corvairs represent an example of negligent design because of the widely-known deficiencies of swing-axle rear suspensions when used in such machines, plus the recognized superiority of available alternatives, (e.g., the full-independent rear suspension) it should be noted that liability for related accidents was not imposed upon General Motors until late 1966,⁴¹ prior to which time, General Motors had prevailed in several similar cases.⁴² The central issue in these cases has been whether or not the above-described characteristics of the Corvair make it in fact a defectively designed car. Cases in which General Motors has prevailed have been disposed of by the reasoning that while the Corvair behaves differently from other domestic cars, it presents no distinctive risks when compared to other rear-engine, swing-axle machines, and is therefore not defective. It is reasoned further that Corvair's departure from the standard design of domestic cars does not constitute negligence in itself.⁴³ While this is indeed persuasive, it is apt to lead to the error of restricting the manufacturer's duty to that of designing a car which performs adequately only as compared to other machines of like design. Since it is arguable that certain automotive designs, while widely used, are seriously defective from the safety standpoint, imposition of such a narrow standard of care appears to be a mistake.

Another recent case which is of prime interest because of its heavy reliance on matters of design rather than other considerations was decided against the Ford Motor Company and another, unrelated defendant in a South Carolina trial court.⁴⁴ A verdict of 780,000 dollars was obtained by the plaintiff for serious injuries received while riding in a 1949 Ford sedan which was struck in the left front side by another vehicle. As a result of the impact, which produced a severe lateral movement of the car to the right, the plaintiff was impaled

⁴⁰ "Given the set of design requirements Chevrolet is heir to, they can make—and, in the '65 Corvair, have made—an engine-behind-the-axle car handle as well as any rear-engined sedan, better than most front-engined passenger cars and even better than many sports cars." *Road Research Report: Corvair Corsa*, Car and Driver, Oct. 1964, pp. 31-32.

⁴¹ See Wall Street Journal, Sept. 6, 1966, p. 2, col. 4. For a statement of the grounds upon which General Motors has been absolved from liability, see Barron's, Sept. 5, 1966, p. 1, col. 4.

⁴² Wall Street Journal, *supra* note 41.

⁴³ See Barron's, *supra* note 41.

⁴⁴ *Mickle v. Blackmon*, Cherokee Const. Co., & Ford Motor Co., Cir. Ct., 6th Jud. Cir., York County, S.C., (March 1963), discussed in Nader, *Automobile Design: Evidence Catching up with the Law*, 42 DENVER L. CEN. J., 32, 37 (1965).

upon the end of the column gear shift lever. As to defendant Ford, three specific showings of negligence were offered, all related to the design of the gearshift lever and knob. These were (1) that the gearshift lever projected "well beyond" the rim of the steering wheel,⁴⁵ thereby unreasonably magnifying the risk of injury to occupants when thrown about in the car as a result of collision or upset, (2) that the end of the gearshift lever had no collar or other device on it to prevent the round protective knob from being pushed downward on its shaft, thereby exposing the sharp end of the gearshift lever, upon which plaintiff was impaled,⁴⁶ and (3) that the knob was improperly designed to prevent its breakage, and was made of an inferior plastic which checked and deteriorated with age.⁴⁷ In support of the latter contention, plaintiff introduced evidence that the defendant had, on its 1951 models, redesigned the knob, and cast it out of a different type of plastic which was more durable.⁴⁸

By way of comparison with industry practice plaintiff offered proof that other automobile manufacturers (1) did not design the gear lever so as to project beyond the radius of the steering wheel rim,⁴⁹ (2) equipped the shaft of the gear lever with a collar or shoulder to prevent the knob from being forced down the shaft, and (3) employed a different means of fastening the knob to the lever. By these showings, plaintiff sustained the onus of proving that Ford had deviated significantly from general industry practice in gearshift lever design, and that its deviation materially increased the risk of occupant injury. In order to prove that the defect was sufficiently likely to cause injury as to constitute negligence in design, plaintiff expressly analogized the facts in its case to those of *Goullon v. Ford Motor Co.*,⁵⁰ in which

⁴⁵ The impression gained from the allegations in the Mickle case is that the Ford gearshift projects unusually far from the rim of the steering wheel. This is not sustained by observations, since while the 1949 Ford gearshift lever projects 1- $\frac{3}{4}$ inches beyond the circle described by the wheel in neutral (center) position, comparable measurements on the 1949 Plymouth are 1 $\frac{1}{16}$ inches; Chevrolet, no projection; 1946-1948 Fords, 1 $\frac{1}{8}$ inches. While this is in no way conclusive of the matter of negligence, it should be noted also that gear changes with manual transmissions are rendered quite difficult if the gearshift lever is obscured by the steering wheel.

⁴⁶ The 1949 Ford gearshift lever is a solid metal rod, differing from most other manual transmission cars, which use a lever formed from stamped sheet metal. The end of the Ford lever presents a flat surface of approximately three-eighths of one inch in diameter, with the knob removed.

⁴⁷ Such deterioration is known as "crazing," and is evidenced upon close examination by a myriad of tiny cracks at close intervals on the surface of the plastic.

⁴⁸ Admissibility of evidence of subsequent design change for the limited purpose of showing the feasibility of the allegedly preferable alternative was established in *Boeing Airplane Co. v. Brown*, 291 F.2d 310 (9th Cir. 1961).

⁴⁹ See note 44 *supra*.

⁵⁰ 44 F.2d 310 (6th Cir. 1930).

defendant was found liable for damage arising from the breakage of a tractor steering wheel. In *Goullon*, it was shown that while the steering wheel was of adequate strength for most purposes, it was capable of breakage if the screws through the rim should work loose, as they allegedly had. It was therefore established that a manufacturer could be held liable for defects which were not of a type likely to occur during normal service, but attributable nevertheless to a weakness in design. The relevance of such a ruling on the matter of the gearshift lever case is plain because of the very unusual manner in which the plaintiff was injured. The combination of proof that Ford deviated from industry practices, demonstrated by custom to be feasible, and in a manner which unreasonably and foreseeably magnified the risk of injury to users, was therefore sufficient to establish the liability of the defendant. Whether or not the type of injury incurred by the plaintiff was a reasonably foreseeable consequence of a relatively slight lengthening of the gearshift lever, presumably done to place it within more convenient reach of the driver, is certainly questionable, especially in light of the rather bizarre type of second-collision injury in this case. Also, it appears that inadequate consideration may have been given to the role which may have been played by normal wear in the failure of the plastic knob on the gearshift lever, which, it should be noted, was on a car which was fourteen years old at the time of the accident. Nevertheless, plaintiff's arguments represent a sound approach to the issue of defective design.

The age or condition of a machine claimed to be of defective design may present a significant and difficult issue in determining the initial existence of defective product design. If a manufacturer is able to show that the defect claimed is a product of normal wear rather than defective design, there will be no recovery, since there is no duty of perfection imposed.⁶¹ However, there has been a tendency for courts to accept the fact of long service or old age of a vehicle as sufficient to establish that the defect in a specific component was the reasonable consequence of normal wear, without further consideration of the possibility that the cause in fact of the specific defect was attributable

⁶¹ See, e.g., *Gomez v. E. W. Bliss Co.*, 27 Misc. 2d 649, 211 N.Y.S.2d 246 (1961), in which the manufacturer of a nine-year old power press was absolved from liability on the grounds that there was no duty of the manufacturer to furnish a machine which would not wear out, and *Auld v. Sears, Roebuck & Co.*, 261 App. Div. 918, 25 N.Y.S.2d 491 (1941), *aff'd*, 288 N.Y. 515, 41 N.E.2d 927 (1942), wherein the user's remedy was stated to be reasonable inspection for and replacement of worn parts of a washing machine.

not to wear, but to design factors.

An example of this reasoning is the case of *Solomon v. White Motor Co.*,⁵² in which the plaintiff's injuries were caused by the disintegration of the engine flywheel of a semi-tractor. Proof was offered that the flywheel was defectively designed, increasing the risk of disintegration, and was manufactured from a defective alloy. Recovery was denied on grounds that the tractor had covered over 100,000 miles. The court stated that such length of service created an inference that the failure was a reasonable consequence of normal wear.⁵³ A sounder result would have been reached on the wear issue if there had been, instead of such an inference, a consideration of the factual connection between long mileage and the disintegration propensities demonstrated by properly designed and constructed flywheels. The fact that a vehicle is virtually worn out should not qualify the manufacturer's liability for defective design in cases where the defect is not reasonably related to wear.

Even where a plaintiff is able to make out a convincing case for negligent design of a product, it is nevertheless not always clear that liability will follow. For if the alleged defect which caused the damage is patently obvious even to the casual observer, the plaintiff may be charged with notice of the defect, and barred from recovery by reason of assumption of risk or contributory negligence.⁵⁴ These defenses, which even recently have retained considerable efficacy, seem to have little basis in either sound policy or tort law, since in the case of many defects, motorists are obliged either to live with them, or else give up driving automobiles.⁵⁵ One of the classic applications of the notice rule was a 1957 New York case⁵⁶ in which the plaintiff complained of

⁵² 153 F. Supp. 917 (W.D. Pa. 1957).

⁵³ *Id.* at 919.

⁵⁴ See *Amason v. Ford Motor Co.*, 80 F.2d 265 (5th Cir. 1935) (plaintiff's decedent thrown out of car with rear-hinged doors); *Saeter v. Harley-Davidson Motor Co.*, 186 Cal. App. 2d 248, 8 Cal. Rep. 747 (Dist. Ct. App. 1960) (plaintiff injured because steering damper on motorcycle would not stay tight, and a related accident occurred). While application of strict liability doctrine negates the defense of contributory negligence, facts which would tend to prove contributory negligence under negligence theory are frequently applicable to show lack of proximate cause of injury, or establish the absence of a duty to protect the consumer from his willful or intentional conduct. See Prosser, *supra* note 25, at 827.

⁵⁵ While selection among makes of cars may enable a buyer to avoid driving cars with certain design defects, some defects are so widespread that there is no real choice. An example is the widespread use on four-door sedans of rear doors which hinged at their rear edge, which caused the door to open forcefully if unlatched at road speed. See Appendix for table indicating the prevalence of this design over a period of years.

⁵⁶ *Thomas v. Jerominek*, 8 Misc. 2d 517, 170 N.Y.S.2d 388 (1957).

injuries incurred as a result of being swept out of the rear seat of a Studebaker four-door sedan by the sudden and violent opening of the rear door while the car was underway. The explanation for the accident was that the plaintiff had inadvertently opened the door, and the windstream generated by the moving car was able to catch hold of the door. This occurred because the door was hinged at the rear rather than the front as is current practice. The question of negligence in designing a rear hinged car door in the face of the known feasibility and superiority of front-hinged doors was never reached, since the court found the plaintiff to be foreclosed from recovery because of the obviousness of the consequences of opening such a door while the car was in motion. This ruling seems all the more Draconian because of the fact that the plaintiff claimed that he had never intended to operate the door at all, but merely desired to open the window, and manipulated the wrong control. The striking similarity between the window crank and the door handle on Studebaker cars is sustained by observation.⁵⁷

It is contended that while it is not realistic to bar a plaintiff's claim because he "knew" of the defect, there should be a point where blatant acts of negligence or disregard by the plaintiff or third persons should cut off the manufacturer's responsibility. An example of a miscarriage of justice resulting from a failure to limit the manufacturer's liability to a reasonable extent is the 1959 case of *Comstock v. General Motors*.⁵⁸ There, the defect alleged, and conceded by defendant, was an error in the design of the vacuum boosted power brake system in the 1953 Buick Roadmaster, which caused the brake fluid to be drawn out of the master cylinder by the vacuum generated by the booster system,⁵⁹ with resulting brake failure. In *Comstock*, the owner of the car had experienced such a failure, and had left the machine in the hands of a Buick dealer to have the defect corrected. While in the care of the dealer, the car was driven by an employee who had been told of the brake failure but had forgotten. Plaintiff was struck and injured by the car because of its inability to stop. The intervening negligence of

⁵⁷ Virtually the only difference in the conformation of Studebaker door handles and window cranks on some models is that the window crank is equipped with a small plastic knob.

⁵⁸ 358 Mich. 163, 99 N.W.2d 627 (1959). The manufacturer was held not to be absolved of liability if the intervening negligent act was a foreseeable consequence of the defect.

⁵⁹ A faulty seal intended to isolate the vacuum stage of the brake system from the hydraulic stage failed, with the result that the hydraulic brake fluid was sucked into the intake manifold, where the vacuum is generated, and burned in the engine.

the dealer's employee was held no bar to recovery against the manufacturer. If this rule ever receives wide following, it is fair to assume that no kind of warning to users will ever absolve a manufacturer of liability for producing defective equipment. While it is equitable to hold General Motors liable for the proximate consequences of building brakeless Buicks, it does not appear reasonable to impose liability where there is intervening negligence on the part of the only agency to which correction of defects may be entrusted by the manufacturer.

Perhaps a fair compromise between the foregoing extremes is the solution found in *Ford Motor Co. v. Wagoner*,⁶⁰ where the plaintiff was injured as a consequence of the failure of an admittedly defective hood latch. Recovery was denied, however, on grounds of notice, since the plaintiff, an employee of a Ford agency, had been informed of the defect and had refused the offer tendered by the manufacturer to all owners to have the latch modified free of charge. Since he is in no position to make meaningful selection among alternative designs even with the fairly wide choice of makes available, the motorist ought to be afforded a remedy for defects he may know about. It is unfair, nevertheless, to make the manufacturer an insurer of all persons injured when the injury has tenuous relationship to the defect.

As indicated above, the primary problem in any case of product design liability is the establishment of the defective nature of the design. In automotive cases, the usual tendency is, of course, to direct consideration only to such components of the car as are claimed to be the cause of injury, largely because of the functional complexity of an automobile. It becomes readily apparent that certain automotive components, because of the function they must perform, present considerably more risk of harm to users than others. For example, even the best designed windshield of a car is probably more likely to cause injury to occupants upon the occurrence of an accident than is the cigar lighter, even if it is defectively designed so to increase risk of second-collision injuries. It is also apparent that a designer, as a practical matter, faces insurmountable difficulty in removing all foreseeable risk of second-collision injuries from the windshield,⁶¹ since in

⁶⁰ 183 Tenn. 392, 192 S.W.2d 840 (1946).

⁶¹ Use of a seat belt or other passenger restraining device will tend to alleviate or prevent passengers striking the windshield. There is still some risk, however, since the passenger compartment may be so distorted due to collision damage that windshield fragments may injure even the restrained passenger. Also, fastening a seat belt requires an affirmative act by the passenger, and it is foreseeable that it will not be done in many cases. Seat belts are called "active" safety devices, as they require action by the passenger to be effective. Devices such as energy-absorbing

the absence of technological changes not yet discovered, it must remain a hard, transparent sheet placed immediately in front of the car's occupants. The cigar lighter, on the other hand, presents almost unlimited possibilities for alleviation of injury risk. It may be located so that it is shielded from impact, and equipped with a soft, energy-absorbing knob to save those striking it from injury. Furthermore, the fact that the windshield involves inherent risk of second-collision injury does not furnish grounds for its deletion from the automobile, since it is an indispensable component. The cigar lighter, however, can be eliminated from the car without serious consequences if it should be found that the risk it presents could not be reasonably alleviated.

Thus, three issues are developed which, when resolved, assist in determining if a manufacturer has met the standard of care to be imposed. These are (1) the feasibility of design variations of a specific component which would have avoided or alleviated the injuries complained of, and which are contended to be superior, (2) whether, in view of its injury-producing propensity, the component should have been included in the car at all, and (3) the relative likelihood and gravity of injury produced by the offending component as compared with alternative designs.

In attempting to resolve these issues, it may be useful to categorize automotive components as to their function, much in the manner shown in the example of the windshield and cigar lighter. For this purpose, it is noted that most automotive components conveniently fall into one of four categories, which follow.

(1) The first such category contains frivolous gadgetry and accessories which in no way contribute to the function or convenience of the automobile. Such components are sharp edges and trim gadgets protruding from the dashboard which cause or aggravate second collision type injuries,⁶² and protruding ornaments which may cause unnecessary pedestrian injury.

(2) Another group includes components, which while purporting to serve comfort and convenience, actually increase risk as an inherent adjunct of their function. Such a feature is the tinted glass windshield,

dashboard material are called "passive" devices, since their protection is effective regardless of steps taken by the passenger. One survey indicates that only 22% of motorists interviewed fastened their seat belts "every time" they used their car. This would tend to discount the value of such active devices. See O'Connell, *supra* note 23, at 351.

⁶²For illustrations of features on popular automobiles which could aggravate pedestrian injuries, but which do not assist in the function of the automobile, see 16 AM. JUR. PROOF OF FACTS 56-59 (1965).

which while extremely popular as an accessory feature, creates a serious nighttime hazard because of its severely diminished light transmission qualities.⁶³ The distinctive feature of this group is that the purpose fulfilled by the components in it is the very source of the unreasonable risk they create.

(3) A further class is composed of those items which, while contributing to the convenience of the car, present wide possibilities of design variation, enabling the designer to make them incapable of causing or aggravating injury under any foreseeable circumstances. The cigar lighter used as an example in the question above fits this category; while being potentially dangerous, it may be designed in a fashion making it virtually innocuous.

(4) The final category includes components whose function is essential to the operation of the automobile, such as the power plant, brakes, suspension and steering parts. Without devices to fulfill these operations, automobiles would not serve their presently anticipated purposes. The relevantly distinctive nature of these components is that the designer must operate within relatively close limits which are prescribed by the task which the component must accomplish, and the rather parochial conditioning of most operators to the customary technique of driving. While a tiller lever could be theoretically the soundest way to steer a car, it is unlikely that re-education of the driving public to use tillers would be a realistic goal. Therefore, the designer must deal with the problem of the inherent risks of automobile operation, together with the narrow conditioning of the users of the product, and lacks the option to either delete or severely modify the design of such essential components. The scope of alternative designs is therefore much narrower, and courts should not impose liability for characteristics of a manufactured product which do no more than reflect these influences, both largely beyond the control of the manufacturer.

By examining injury-causing components in this manner, decisions as to whether a manufacturer has discharged its duty of knowing about and applying (which includes the duty of testing its product for dangerous propensities) a preferable design alternative may be made on a narrower and more manageable basis. This is due to the fact that by

⁶³ The diminished light transmission qualities of tinted glass windshields "contribute significantly to the hazard in nighttime driving. . . ." according to one expert. See Haber, *Safety Hazard of Tinted Automobile Windshields at Night*, 45 J. OPTICAL Soc'y 413, 418 (1955), noted in Katz, *supra* note 17, at 870.

use of such categorization, the scope of feasible alternatives is more readily determined, since, as noted before, the function of a component and its amenability to design variation establishes the outer boundary of practical alternative designs. Once the extent of such alternatives is determined, it is easier to decide if a plaintiff has met the prerequisite of proving that there was in fact an alternative design which would have alleviated the risk of the injury complained of, and that it would have been a choice which the manufacturer should have adopted if it had discharged its duties of knowledge of, and proper selection among available options.

[Appendix on next page.]

APPENDIX

Major Makes of U.S. 4-Door Sedans Equipped with Rear-Hinged Rear Doors, 1930-1967.

Manufacturer	Make	Rear-Hinged Doors; Dates of Manufacture	Front-Hinged Doors; Dates of Manufacture
Chrysler Corp.	Chrysler DeSoto (1961) Dodge (incl. Dart) Plymouth (incl. Valiant)	through 1948† through 1948 through 1948 through 1948	1949-1967 1949-1961 1949-1967 1949-1967
General Motors	Cadillac (incl. LaSalle) Buick Oldsmobile Pontiac Chevrolet	through 1940‡ through 1940 through 1940 through 1940 through 1940	1941-1967 1941-1967 1941-1967 1941-1967 1941-1967
Ford Motor Co.	Lincoln (incl. Continental) Mercury (incl. Comet) Ford (incl. Falcon) Thunderbird* Hudson (1957)	through 1951; 1962-1967* through 1951 through 1948 1967* through 1948	1952-1961 1952-1967 1949-1967 — 1949-1957
Hudson (American Motors) Nash (American Motors)	Nash (1957) Rambler	through 1948 —	1949-1957 1953-1967
Studebaker	Studebaker (1965)	through 1952	1953-1965
Packard	Packard (1958)	through 1942	1946-1958

† some 1947 4-Dr. models equipped with front-hinged rear doors.

‡ possible variations where equipped with bodies fitted by independent coachbuilders

* equipped with automatic lock preventing rear door opening while underway

() indicates last year of production